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FORAGE CROPS

AND

STABLE AGRICULTURE

by R. Whiteman

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FOREWORD

This booklet "Forage Crops and Stable Agriculture" was orginally printed in the Fall of 1945. *Several reprints have been issued to meet the very encouraging response from farmers and students. Now, Mr. Whiteman has kindly brought the subject matter up to date and we are pleased to offer this revised issue.*

This booklet has been prepared to emphasize the farmer's responsibility to the present and future generations and to offer guidance in the wide use of a variety of crops and better farming practices.

It has been said that all source of life on this planet is in the top six inches of the earth's crust. If this be so, and we believe it is, then a great trust and responsibility rests with those who cultivate the soil and produce the food for mankind.

Producing food to maintain life is a responsibility. Cultivating the soil for crop production, so as to maintain its tilth and fertility for future generations, is indeed a great trust.

W. J. PARKER,
President,
Manitoba Pool Elevators.

Revised Issue, 1949.

OUR HOMELAND

DEEP DOWN within the heart of every good farmer there is a love of the land. It matters not what the walk of life may be, there is ever a call to get out and dig in Mother Earth—to plant a seed, tend it as it develops upward toward the sun, and harvest the fruit thereof.

Spring finds the farmer getting ready to sow his acres and the progressive business man, whether in city, town or village, longing for the end of each day so that he may get out in his garden. Every good farmer loves the soil and everyone loves this great country of which each is a part. We are builders of homes and our children are becoming conscious of their birthright.

Regardless of what our calling may be, our roots are in the soil and today the farmer is equal in rank with any other profession. We must never lose sight of the fact that AGRICULTURE is Canada's main source of wealth. The soil is the measure of a country's true value. No matter what other resources Canada may have, she can hold her place in the sun only as long as her soil is capable of feeding her people.

Our soil must be preserved for future generations and every care taken to keep its fertility at a high level. No longer can we afford to continually grow crops of grain and expect to maintain productivity. Our farming operations must be carefully balanced and fibre added to prevent the soils themselves from being carried away by wind and water. It is hoped that the following pages may assist those, who, with a thought for the future, recognize the need for change in their farming operations.

OUR HERITAGE

Western Canada is still in its infancy in so far as agriculture is concerned, and we are constantly finding some new method whereby more abundant crops may be produced, some new treatment for the prevention of disease among our farm animals or field crops, short cuts to save labor and new methods in the care and handling of the commodities produced for market.

Rapid advances have been made in the methods of handling this new land since the first sod was turned on these western plains. The ox was replaced by the horse and it in turn has been set aside in favor of the tractor. These changes have necessitated a change in our farming practice and today the farmer must be a keen student, ever ready to try out new methods. Former methods of tillage are obsolete. Varieties of grain popular a few years ago have been replaced by new varieties more resistant to disease, of higher yielding capacity and of better quality.

On these western prairies the introduction of grass and clover has been much slower than in the east. The reason for this is fairly obvious. We are essentially a grain growing region and the precipitation is relatively light when compared with Ontario, Quebec or the Maritimes. For this reason our soils have not deteriorated nearly so rapidly as have those in the east. The plant food available is still sufficient to grow good crops when there is plenty of rainfall. Consequently it is hard for us to realize that year by year our soils become less fertile. Slowly but surely over this western country the texture of the soil has been changed. The fibre has been destroyed, leaving the soil loose with nothing to bind it together. Every wind lifts tons of this fine material and gradually the fertile portion of the soil is carried away. This change is so slow that it does not become apparent to the land owner until the top soil is completely removed, leaving only the small stones and gravel. When dry windy years come the land is devastated. The farm becomes a desolate waste and eventually the farmer is forced to leave. In the United States thousands of such farms are now abandoned and millions of acres will never, within our time, see the plow again. Possibly a future generation may solve this problem of waste land. Today, it seems that nothing can be done about it.

This vast inland Empire of ours has not yet reached the stage where large areas need to be abandoned. During the dry years, however, more and more of our soils do become so depleted that thousands of acres are removed from cultivation. As yet far too few realize the seriousness of our present soil condition, for when the rains do fall, crops again grow and produce. We forget the dry years and look hopefully to the future. It has been truly said that "This is a next year country." Our vision is ever ahead, which is all to the good, but too often we fail to look down at Mother Earth to find her secrets.

Let us face the facts and try in every way possible to profit from past experiences. We must realize that abundant rains do not fall every year and that periods of drought will come again. It is of vital importance that the fertility of the soil from which we derive a livelihood be maintained. It is our duty to care for Mother Earth and prevent her from being destroyed. This can only be done by careful methods of cultivation, crop rotation and the introduction of grass and clovers. Better use of the soil is the challenge to this generation. "The soil is our heritage."

SOIL EROSION

When the prairie sod was turned with the plow, the top soil was a mat of root fibre which held the soil particles firmly together. This soil was extremely fertile. Consequently, in years of average rainfall, crop yields were very high. However, when land is subjected to cereal crop production for a number of years, the fibre in the soil gradually disappears, leaving the soil particles with nothing to bind them together. This condition causes the

A field ruined by one heavy rain.

light material of the soil to be carried away with the wind. At first this is a gradual process, but increases as the seasons pass, until the entire top layer of the soil has been completely removed, leaving the coarse sand and gravel or the unproductive portion of the soil.

Water also has been a destructive force on the soil. Where the land is rolling the soil is washed from the higher areas into the depressions. As this condition increases gullies form, causing tremendous loss of soil. If these gullies are not checked, the

immediate area becomes useless for crop production. The general impression is that in a climate such as ours, the rainfall, as a rule, is insufficient to cause damage. Unfortunately, under dry conditions the soil is extremely loose and when rain falls it is easily washed away from the higher levels, causing tremendous loss.

METHOD OF CONTROL

There is only one way to definitely control soil erosion, i.e., imitate Nature. *Seed to grass in years when moisture is sufficient to secure good germination and thereby insure a catch.*

Soil eroded by wind.

TAKING GOOD LAND OUT OF CEREAL PRODUCTION

The capacity of a soil to produce cereal crops usually determines the type of agriculture carried on. Where normal yields are moderately high it takes much thoughtful consideration to convince ourselves that a change in farm practice will not reduce farm income.

How gullies are formed.

The problem that presents itself is that of arranging a rotation of crops that will be beneficial to the soil and at the same time produce sufficient revenue to make it possible to finance the farm.

On the open plains where the water supply is from dug-outs the keeping of livestock in any numbers is difficult, therefore the seeding to grass of areas devoted to wheat has not been considered good business. In the central and northern districts, water is more plentiful and as a rule the farms carry a considerable number of stock. Here it is highly desirable that hay and pasture be grown, and the farms can more easily be arranged to include grass, hay and pasture in the rotation.

The matter of economical utilization of grass and clover crops deserves considerable attention. If assurance can be given that cash returns equal to cereal crops can be obtained, then much larger acreages will be seeded annually. Time has clearly shown that no part of the earth can continue to produce at a high level unless the constituents removed by growing plants are returned to the soil. The fibre in the soil must be maintained. The seeding of grass and clover is a necessity if our farms are to be kept in a productive state. The results obtained from such practice when the land is again broken up will repay many times the apparent loss through smaller acreage in cereal crops.

ECONOMIC USE OF GRASS AND CLOVER

The proper utilization of every acre of the farm is just as important to the farmer as every square foot of space in a factory is to profitable production for the owner. On the open plains where every acre of the farm can be utilized for grain production and where water is a problem, it requires much study to properly balance the farm operations. It is extremely important that grass be seeded to conserve the soil. If it is impossible to carry any considerable number of stock, grass seeded with the grain crop and then left down for at least two years, will produce a large quantity of fibre. This grass can be cut for hay or if the land is free of noxious weeds, seed may be harvested as a cash crop.

In the northern districts where the water supply is usually more plentiful, stock can be kept in reasonable numbers and grass seeded for hay and pasture. It is much easier to change the farming practice here, and each department can be made to dovetail so that crop production is maintained at a high level with stock to provide added revenue. The grass for hay and pasture can be increased until approximately one-fifth to one-quarter of the farm is devoted to such crops. In a relatively short period the entire farm will have received the benefit of grass and clover. The added manure from the barn, used properly, will also fertilize a good sized area each year. With a careful balance maintained the farm will become more productive, work will be more evenly distributed, and the farm become a well established manufacturing plant.

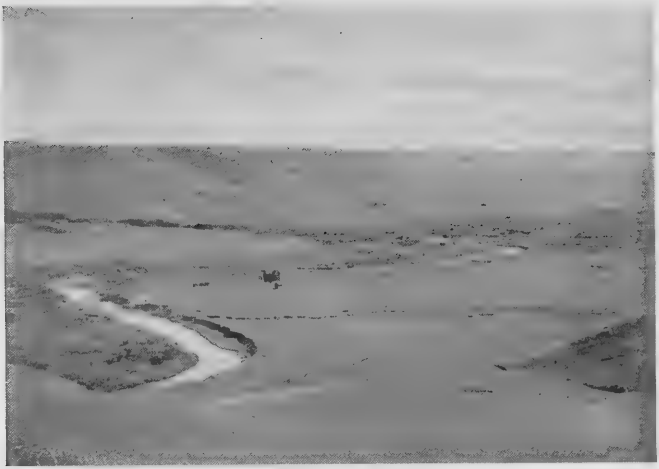
CROP ROTATION

Every farmer follows some system of rotation. The wheat-grower usually summerfallows one-third or one-quarter of his cultivated land each year, wheat being sown on fallow and second crop land, with barley or oats on third crop land. The barley or oat land is then fallowed the next year. Such rotation continually takes valuable material from the soil, but nothing is returned.

The suggestion of changing this usual rotation to one which includes soil-building crops promotes the erroneous idea that a large cash outlay is necessary. Consequently, the suggestion is too often set aside.

A rotation which includes soil-improving crops can be utilized at little expense, even on the open plains area.

Sweet Clover seeded in the spring with a crop of wheat on second crop land may be turned under the following year as a summerfallow. If the second or third crop land is seeded to grass or Sweet Clover, even though few stock are kept, the land will improve rapidly. Fibre will be added which will prevent the wind from blowing the soil away.



Combined effect of wind and water erosion.

PRODUCING QUALITY HAY

The quality of Grass and Clover hay depends on two factors:

1. The stage at which the hay is cut.
2. Proper methods of curing.

STAGE AT WHICH HAY IS CUT

The percentage of protein which is one of the most valuable constituents of any feed is directly related to the stage of maturity at which the crop is cut. The following table shows that Alfalfa cut at the bud stage contains the maximum percentage of protein, with the protein content progressively lower as the plants reach full bloom.

Bud stage	19.5% protein
1/10 bloom	18.5% "
1/3 - ½ bloom	17. % "
Full bloom	16. % "

(United States Dept. of Agriculture Bulletin No. 1838)

The bud stage at cutting time will mean that the plants will not have attained their maximum growth, consequently the yield of hay will be reduced. However, the quality of the hay will be high. If the crop is cut when about one-quarter in bloom, the loss of protein will be balanced by the extra growth of stem and leaf.

Grass crops, while lower in protein content, do show similar results. Cutting of grass crops should be done just when headed out or before coming into bloom.

PROPER METHODS OF CURING

The feeding value of hay depends on the condition of the dried material when put in a stack or mow. In the case of Clovers the leaves form the most valuable portion of the feed, therefore these must be preserved. In order to procure the highest feeding values in hay crops the green color must be maintained. The green color is associated with the carotine content of the leaf and stem. This material contains provitamin A. Green color is also an indication of its palatability and the color also largely determines its commercial value. The following table shows comparative amounts of provitamin A content in graded commercial hay:

No. 1 Grade 60% green color	43 parts carotine per million
No. 2 Grade 35.59% green color	15 parts carotine per million
No. 3 Grade below 35% green color	4 parts carotine per million

This table shows very definitely that hay badly bleached has lost the greater portion of its carotine content.

The object then in preparing high quality hay must be to keep the loss of leaf and green color at a minimum while reducing the moisture content to a safe limit for stacking outside or putting in the barn.

A mixture of brome and alfalfa producing high-quality hay.

Hay should be cut when the dew is off and the clover or grass dry. Leave in the swath for from four to eight hours, then rake in small windrows. If a side delivery rake is available, so much the better. It is important in cutting hay, not to have a greater amount in the swath than can be handled at the right time.

The moisture of the hay should be reduced to or below 25%. At this stage it will not form a rope when twisted in the hand but the odd stem will snap. As soon as the hay is sufficiently dry it should be stacked or placed in the mow.

SEEDING RATES AND VARIETIES

Where rainfall is comparatively low the amount of seed per acre used should be reduced. The number of plants per square foot has a direct bearing on the quantity of hay per acre produced. Where moisture is the limiting factor a comparatively thin stand will produce more hay because of a better utilization of the available moisture. The kind of crop grown also has a direct bearing because some kinds of grass will stand up better under lower moisture than others. A good mixture should always include a clover or alfalfa because it will produce a feed of higher protein content.

MIXTURES FOR HAY PRODUCTION

In areas where moisture is deficient:

Mixture No. 1	Brome	5	lbs. per acre
	Crested Wheat	5	" " "
	Alfalfa	3	" " "
Mixture No. 2	Brome	10	" " "
	Alfalfa	3	" " "
Mixture No. 3	Brome	5	" " "
	Slender Wheat	4	" " "
	Crested Wheat	3	" " "
	Alfalfa	2	" " "
No. 4	Brome	10-12	" " "

In areas where moisture is plentiful:

Mixture No. 1	Brome	6	lbs. per acre
	Meadow Fescue	5	" " "
	Alfalfa	3	" " "
Mixture No. 2	Brome	8	" " "
	Alfalfa	4	" " "
Mixture No. 3	Meadow Fescue	5	" " "
	Timothy	4	" " "
	Alfalfa	4	" " "
No. 4	Brome	12	" " "
No. 5	Alfalfa	7-8	" " "

On low areas under water for a time in spring:

Mixture No. 1	Brome	6	lbs. per acre
	Meadow Fescue	4	" " "
	Alsike	2	" " "
Mixture No. 2	Brome	6	" " "
	Timothy	4	" " "
	Alsike	2	" " "
Mixture No. 3	Meadow Fescue	8	" " "
	Alsike	4	" " "

On land under water over two weeks:

Mixture No. 1—Brome	4	lbs.	per	acre
Slender Wheat	4	"	"	"
Meadow Fescue	3	"	"	"
Timothy	2	"	"	"
Mixture No. 2—Reed Canary	4	"	"	"
Red Top	3	"	"	"

LABOR SAVING MACHINERY

Consideration must be given to labor saving devices; in this modern age the old hand method is too slow. With shortage of labor and the multiplicity of other farm work, every means should be planned to lessen labor. The hay loader and slings, of course, is one method of placing hay in the mow. The sweep with stacker, cuts down haying time when hay is stacked outside, making it possible to take advantage of the weather and get the hay in stack with a minimum loss of leaf and color. The Departments of Agriculture in the various provinces have circulars giving full particulars regarding the making of labor saving devices for haying.

MEASURING HAY IN STACKS

Oblong or rectangular stacks.

Multiply the distance from the ground on one side over the top to the ground on the other side—by the length—by the width—multiply by 3—divide by 10—then divide by the cubic feet in a ton of hay.

Estimated number of cubic feet per ton of hay stacked from 30 to 90 days.

Alfalfa	—470	to	485	cu.	feet	per	ton
Clover	—400	to	422	"	"	"	"
Tame Hay	—620	to	640	"	"	"	"
Wild Hay	—450	to	600	"	"	"	"

PASTURES

The pasture is of great importance in the profitable production of livestock, since this requires the provision of ample supplies of suitable feed at all seasons of the year.

The day of the open range is passing and the livestock producer is being forced to think of cultivated pastures. It has been a common practice to use for pasture land, that portion of the farm which has not been suitable for grain crop production. The native

Cattle thriving on excellent pasture.

grass, in too many instances, has been killed by continual cropping and tramping; the so-called pasture has become barren land which cannot provide the necessary feed for thrifty livestock.

What then constitutes a good pasture? To find the answer an approach can be made by giving thought to the requirements of the different classes of livestock the pasture is designed to serve.

First, the young stock. They should grow rapidly and while they must be kept in good condition, excessive fat is not desirable. The young animal is growing bone and muscle and this requires proteins—furnished by legumes such as Clover, Alfalfa, Peas, Vetches, etc.

Next, the milch cow, whose function is producing milk. She must be in good healthy condition; no excess fat is desirable, but high production of milk is of prime importance. The pasture must supply ample roughage, furnish an abundance of protein and its

share of carbohydrates and fats. Nutritious grass and clover must be provided.

And then the fattening animals must have a balanced feed if they are to make economical gain. They should go into winter quarters in good condition. This can only be accomplished by means of adequate pastures.

The pasture then must provide ample feed during the summer months, but it must be supplemented with concentrates such as grain if the pasture is to fulfil its purpose. Pasture should furnish green feed early in the spring. During the hot dry months of July and August most grass crops become more or less dormant. This is a critical period when the pasture might be supplemented with some green feed, such as green oats, barley or millet. The pasture should pick up as fall approaches and remain green till hard frosts occur.

A good pasture should consist of as wide a variety of grass and clover as possible in order to maintain maximum feed levels during the entire season; therefore, include more than one grass in the pasture mixture.

The area is also important. Grass requires moisture; the more rainfall within reason, the greater the carrying capacity. A pasture should at least carry one cow per two acres even under moderately dry conditions if it is to be profitable. Selection of grass and clovers should be made to suit the area.

PASTURE MAINTENANCE

1. Do not overgraze. Close cropping of a pasture by livestock will seriously damage a pasture.

2. If the pasture becomes too dense a light discing will thin out surplus plants and allow a more vigorous growth.

3. A fence dividing the pasture, allowing stock to be rotated, will give increased amounts of pasture.

4. Barnyard manure spread on a portion of the pasture will tend to keep stock from this area for some time in the early summer or until heavy rains have occurred. This allows the manured area to produce a heavy stand while the stock are on the other portion.

5. Where there is a deficiency of phosphorus in the soil, applications of commercial phosphate fertilizer will increase the amount of growth. It will also increase the phosphorus content of the grass. Livestock will pasture on fertilized areas and leave other pasture.

6. Do not turn stock on pasture early in spring or before there is a good stand of grass.

7. Stock should not be allowed to crop the pasture too close late in the fall. Sufficient growth should be left to hold a blanket of snow during the winter.

"Most Undesirable"
Even land of this type can be converted into good pasture.

MIXTURES FOR PASTURE PRODUCTION

In areas where moisture is deficient:

Mixture No. 1	Brome	4 lbs. per acre
	Crested Wheat	3 " " "
	Slender Wheat	4 " " "
	Alfalfa	4 " " "
	Alsike	2 " " "
Mixture No. 2	Brome	10 " " "
	Alfalfa	4 " " "
Mixture No. 3	Crested Wheat	4 " " "
	Brome	4 " " "
	Alfalfa	3 or 4 " " "

In areas where moisture is plentiful:

Mixture No. 1	Brome	4 lbs. per acre
	Meadow Fescue	3 " " "

	Crested Wheat	3	"	"
	Timothy	2	"	"
	Alfalfa	2	"	"
	Alsike	2	"	"
Mixture No. 2—Brome		8	"	"
	Alfalfa	4	"	"
Mixture No. 3—Brome		5	"	"
	Meadow Fescue	4	"	"
	Crested Wheat	3	"	"
	Alfalfa	3	"	"
Mixture No. 4—Meadow Fescue		4	"	"
	Crested Wheat	4	"	"
	Alfalfa	4	"	"
Mixture No. 5—Brome		6	"	"
	Crested Wheat	5	"	"
	Alfalfa	4	"	"

SEEDING GRASS AND CLOVER

Careful work in preparing a seed bed is one of the best means of assuring a stand of grass and clovers. A solid stand is essential because any spaces left in the field are ideal places for the propagation of weeds. A poor catch is not profitable from the standpoint of yields of hay or pasture.

The usual seed-bed preparation for cereal crops is not sufficient for grass and clovers. The seed of cereal crops is much larger in size and in most cases has ample reserve of plant food to enable it to withstand adverse conditions such as cool soils or low moisture, either of which will cause delayed germination and growth. Grass and clover seed, being extremely light in weight and small in size, require a finely pulverized seed-bed. The soil must be worked down to form a fine compact seed-bed and moisture should be ample and close to the surface.

SUMMERFALLOW FOR GRASS AND CLOVERS

The initial cost of seeding down for hay or pasture is usually somewhat higher per acre than that of cereal crops; therefore, every care should be taken to assure good germination. Shallow seeding of these crops is a necessity. On soils containing abundant moisture a well prepared summerfallow is much more likely to fill this requirement. In preparing summerfallow, surface cultivation should be done when the grain crop is removed in the fall with either the one-way disc or stiff-tooth cultivator. Many weeds on or near the surface should then germinate and be killed by winter frost. During the following summer, cultivation done when weed growth is apparent or following heavy rains should leave the land well prepared for grass or clover, comparatively free of weeds and with sufficient reserves of moisture to provide for rapid germination and a vigorous growth.

NURSE CROPS FOR GRASS AND CLOVER

It is a debatable question whether a nurse crop is essential for grass and clovers because there are so many factors involved. It is generally recognized that ideal conditions are to be found on a carefully worked summerfallow; but when seeded without a nurse crop on areas exposed to winds this land may become badly eroded in the early spring before the grass or clover has obtained a root system sufficient to anchor it firmly in the soil, resulting in the crop being either completely blown out or cut off when just above ground. On exposed areas, too, when grass and clover are seeded

alone the snow will drift off in winter leaving the young tender plants exposed before they are sufficiently established to withstand the extreme cold. On the other hand, an objection to a nurse crop is the tendency to place the grass and clover seed at too great a depth.

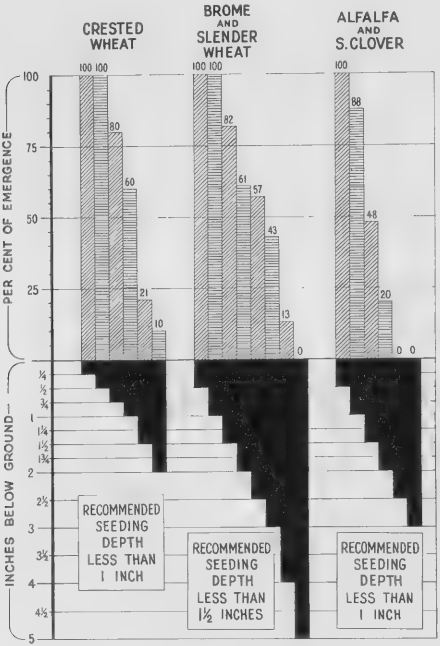
These are just a few of the arguments for and against the use of a nurse crop. After thoughtful consideration the decision might be made to use a summerfallow sown with wheat or flax as a nurse crop. Oats and barley are not suitable for a nurse crop because these become quite rank and tend to shade the ground too much, and when the crop is harvested the grass and clovers are extremely tender with a very poorly established root system, making them subject to winter killing.

This field carried 14 cows on 19 acres and also produced a heavy crop of hay.

DEPTH OF SEEDING GRASS AND CLOVER

Deep seeding of hay and pasture crops should be avoided. The seed of grass and clover is very small and the closer seed can be placed to the surface and still have sufficient soil to protect it, the higher will be the percentage of plants coming above ground. Soil is a factor which must be considered. Heavy soils tend to retain moisture; therefore shallow seeding can be practiced. On light, sandy soils, however, the seed must be placed deeper in order to have available moisture for proper germination.

The following table shows the depth at which various forage crops germinate on moderately heavy soil.



The chart clearly shows that Crested Wheat cannot safely be seeded below one inch in depth, while Brome will stand as much as two inches in depth. This is one reason why Brome can be seeded with Wheat as a nurse crop at a fairly good depth and a satisfactory stand secured. Alfalfa and Sweet Clover make a very poor showing when seeded more than one inch in depth. Deep seeding of Sweet Clover should be avoided, because the seed which does not germinate will remain in the soil for years, and later when turned up near the surface will grow, causing mixtures in the following crop of grain.

RESISTANCE OF FORAGE CROPS TO FLOODING

Grass and clover crops differ as to the length of time they can withstand flooding. During seasons when precipitation is above normal, parts of fields may become flooded and this presents the problem of endeavoring to get grass to grow and produce a crop of hay.

Since grass crops seeded on flooded areas must be able to withstand periods of flooding, a suitable selection should be made of the kind of grass to seed. The Dominion Experimental Station at Swift Current has carried on experiments showing the length of time grass and clover crops will survive flooding. Limits set for crop are as follows:

Sweet Clover	10 days	
Alfalfa	10 to 14	"
Crested Wheat	17 to 21	"
Brome	28	"
Slender Wheat	28 to 35	"
Meadow Fescue	28 to 49	"
Timothy	49	" or more
Reed Canary Grass	49	" or more

Red Top, while not included in the test, will stand 45 days or more of flooding.

The above table may be used as a guide to the kind of grass or clover to grow on spring flooded areas. A mixture is preferable to seeding one variety because it tends to reduce the risk of a complete loss of crop and also produces a more productive crop for hay or pasture.

The Experimental Station at Swift Current advises the following mixture where flooding does not last longer than ten days to two weeks:

Brome	5	lbs.	per	acre
Slender Wheat	4	"	"	"
Crested Wheat	4	"	"	"
Alfalfa or Sweet Clover	1	"	"	"

If flooding occurs for a period of from ten days to three weeks, the above mixture without Clover or Alfalfa may be seeded.

Where flooding extends from three to four weeks the following mixture should assure a crop:

Slender Wheat	4	lbs.	per	acre
Meadow Fescue	3	"	"	"
Brome	4	"	"	"
Timothy	2	"	"	"

If the land is flooded for a period of from four to eight weeks, the following should make a satisfactory mixture:

Meadow Fescue	4	lbs.	per acre
Timothy	2	"	"
Reed Canary Grass	3	"	"

Where land is flooded for periods longer than seven to eight weeks, Reed Canary Grass may be seeded at 8 to 10 lbs. per acre.

ERADICATION OF BROME

On damp soils Brome is very persistent and difficult to eradicate. Care should be taken to keep it well away from shelter belts and trees; here it becomes extremely hard to get rid of and if left unchecked will cause the soil to become so depleted of moisture that the trees will be seriously damaged. Where Brome is seeded on open fields, shallow-plow when the hay crop has been removed, then disc and follow by repeated cultivation. Eradication depends largely on weather conditions. If no rain occurs the top soil can be dried out and the exposed root stocks readily killed. On the other hand, should rains be fairly prevalent the soil will remain moist, making a complete kill difficult.

GRASSES AND CLOVERS SUITABLE FOR MANITOBA

Certain types of grasses and clovers have proven themselves suitable to the soils and climate of Manitoba. There are a number of varieties of these types which, having different characteristics, make them adaptable to the changing conditions found in the Province and to the uses for which they are required. The most common varieties, with their outstanding characteristics, are submitted as information from which farmers, having decided to grow more forage crops, may make their choice.

It should constantly be kept in mind that new varieties become available from time to time as the result of research work being carried on at the Dominion Experimental farms and stations and universities in the various provinces in the Dominion.

A single plant of brome.

BROME

Brome grass is the most popular grass in Manitoba. It has moderate resistance to drought and even on the open plains makes a satisfactory hay or pasture. In the more humid areas it gives high yields when compared with grasses considered better adapted to such areas. It is very palatable and all classes of stock eat it readily.

Brome produces pasture quite early in the spring and continues into late fall. It does not become as dormant during mid-summer as most grasses do.

Its manner of growth is somewhat of a disadvantage because it tends to become sod-bound after a few years. This causes the yield of hay to decrease very rapidly after the third year. However, it will produce good pasture for several years more. This sod-binding can be overcome by top dressing with manure, by the use of the disc, or shallow plowing.

When seeded with Crested Wheat, Brome carries the pasture through the mid-summer, thus maintaining a uniform feeding period.

When seeded with Alfalfa the hay crop gives higher yields per acre than when each is seeded separately. The Alfalfa checks the root development of the Brome and at the same time makes nitrogen available to the crop.

Varieties: **Common**
The standard variety introduced many years ago,

Parkland
Has a much reduced root system when compared with Common. Most of the root or underground stems twine upward from the main root and form new stems. This characteristic makes it appear as a bunch grass. Owing to its habit of growth, the yielding capacity is not as high as Common Brome.

Superior
A licensed variety very similar to Common but more uniform in type.

CRESTED WHEAT

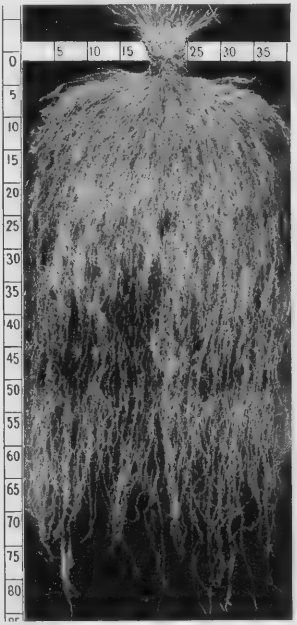
Crested Wheat was introduced into western Canada from Europe. It is quite rust resistant, which makes it an important grass particularly on the open plains. It is a true perennial with a fibrous root system which will extend downward in the soil for several feet. A plant established three years may have possibly three hundred miles of roots. The plant grows to about twenty-four inches in height and the stems are quite fine. This characteristic does not tend to give as high yields of hay when compared with Brome. The quality of the hay is no better than Brome in feeding value.

The great merit of Crested Wheat is its drought resistance. It is one of our first grasses to show green in the spring. During mid-summer, like most other grass, it turns brown if the weather is hot and dry. It responds to moisture rapidly and following a rain will be green in a few days. In the fall this grass remains green till snow falls. These characteristics make Crested Wheat a very excellent pasture grass. Its fibrous roots bind the soil particles

together and to date no grass grown in western Canada offers greater possibilities for seeding on areas exposed to wind erosion. Crested Wheat requires careful treatment in order to get it established.

Seeding Very Early In Spring Is Necessary. If sown too late the young plants will be burned as they come above ground, destroying the stand. If the spring is dry, delay seeding until fall. The seed may be drilled on stubble land so that it will be covered with snow during the winter.

Very Shallow Seeding Is Essential. See chart on page 21 for depth of seeding.



The root system of a plant of Crested Wheat Grass after two years growth.

SLENDER WHEAT GRASS

Slender Wheat is a native grass and is common on the plains areas of this Province. In 1885, Mr. K. McIvor of Virden, planted

some seed from this prairie grass and before many years this was being seeded on a number of western farms.

This grass is a typical bunch grass. It is comparatively short lived and produces profitable crops of hay for only two or three years. It is used as a hay grass only, because its shallow root system does not allow the formation of a sod and it is rapidly killed out by close cropping when stock is pastured on it.

Slender Wheat is quite drought resistant, ranking possibly second to Crested Wheat in this respect. It has some tolerance to alkali and will produce a fair crop of hay on low, slightly alkali spots. Since the introduction of Brome, Meadow Fescue and Crested Wheat, its popularity has waned due to comparatively low yields of hay and its woody texture, especially if cut after heading.

Varieties: **Mecca**
Produced by the University of Saskatchewan.

Grazier
Produced by Dominion Experimental Station, Scott, Saskatchewan.

Fyra
Produced by the University of Alberta.

MEADOW FESCUE

Meadow Fescue is adapted to humid areas. The plant is very leafy at the base, with fairly tall, slender stems. It does not produce as good yields of hay as Brome but its feeding value is extremely good. Where moisture is abundant it is quite hardy.

Meadow Fescue makes an excellent pasture plant due to its abundant leaf system. In mixtures of Brome and Crested Wheat it contributes to the palatability of the pasture. Larger acreages of this grass should be seeded in the northern areas of the Province. It can be seeded with a nurse crop of wheat in the spring at about 1 to 1½ inches deep and at the rate of 10 to 12 lbs. per acre.

Varieties: **Common**

Sturdy
Developed by the University of Manitoba. It is hardy and high yielding.

TIMOTHY

Timothy requires humid conditions for best growth. Its adaptation is the northern areas where it is quite winter hardy. On light dry soils it never becomes established sufficiently to withstand the winter frosts, and consequently kills out frequently.

Timothy will produce about three crops and then the yield gets so low that it must be plowed up. The root system is fribrous. It cannot stand close grazing and during periods of wet weather the

trampling of the stock seriously injures the stand. Where moisture is plentiful it produces good stands of hay, and while the stems are fairly free of leaves, makes a very palatable hay if cut when first headed out.

The seed is small; therefore, seeding at the rate of 6 to 8 lbs. per acre is sufficient. Seed should not be placed below one inch in depth.

Varieties: **Common**

Swallow
Developed by the University of Alberta.

Dural
Developed at the University of Manitoba, for leafiness, tallness of plant and resistance to Timothy rust.

KENTUCKY BLUE GRASS

While Kentucky Blue Grass is an introduction it has become generally distributed over the humid areas of western Canada. It has a fine stem with quite a dense leafy growth at the base, which makes it a splendid pasture plant in the early spring, but as the season advances the hot sun matures it very rapidly. It ripens its seed in late June or early July. This characteristic has caused it to be named June Grass in some localities. The basal growth usually remains green, furnishing pasture after the top growth has turned yellow. The seed is very fine, averaging about twenty pounds per bushel. The seed is easily scattered on the ground if high winds prevail; on this account harvesting of seed must be undertaken promptly once it becomes ripe. It can be mixed with Brome, Crested Wheat or Meadow Fescue on fairly moist soils where a good pasture is desired.

CANADA BLUE GRASS

Canada Blue Grass has very much the same appearance as Kentucky Blue. It is distinguished by its flat stem, while the stem of Kentucky is round. Canada Blue is somewhat hardier and will grow on less fertile soils than Kentucky. It is rather difficult to secure a catch and shallow seeding is necessary. A good policy is to scatter the seed on the ground in the late fall and allow the melting snow to bury it sufficiently to allow it to germinate.

RED TOP

Red Top grows naturally on moist soils adjacent to bodies of water in sloughs. It is a moisture-loving plant. It is very short with exceedingly fine stems. Stock do not eat it readily. One of its special features is its ability to grow on acid soils. Where Wild Barley has

taken possession of low spots in a field, Red Top can be sown after the land is cultivated.

REED CANARY GRASS

Reed Canary Grass is a native of western Canada and is found growing in sloughs where water lies until mid-summer. It is a tall, coarse reed-like grass. If cut just when headed out it makes a fair quality hay. The seed shatters very readily and due to its being found in wet places the seed supply is always scarce. This accounts for the high price of the seed.

TALL WHEAT GRASS—(Agropyron elongatum)

Tall Wheat Grass is useful on land unsuited to most grasses. Plant explorers found Tall Wheat Grass during the early 1930's growing in salt marshes in northern Italy not far from the shores of the Black Sea.

It is a somewhat coarse, erect, perennial, with a bunch type growth, an abundance of long basal and stem leaves make it a high forage producer, comparing favorably with the rest of the wheat grasses in this respect. As the name implies, the mature plant is tall, often reaching a robust five feet and more under irrigation or normal rainfall in the west.

Like other cool season grasses, Tall Wheat Grass does most of its growing in the fall and spring. It is still green a month after Crested Wheat or Brome have become dormant during mid-summer temperatures.

Seed is ready to harvest in August and even at this late date the foliage is green.

Fall and spring foliage is soft and luxuriant but as the plant matures it becomes coarse. In spite of this, hay cut when the crop is headed out shows 66% palatability.

Its outstanding characteristic is its ability to tolerate wet alkaline conditions.

In planting the seed flows freely through the drill.

Seeding Rates vary from 6 to 10 lbs. per acre or about 3 to 6 if planted in rows.

In Nebraska with 40-inch rows, a yield of 400 lbs. of seed was obtained.

Either binder or combine may be used to harvest the seed crop. The seed ripens evenly and does not shatter readily.

Tall Wheat Grass is not a cure-all. It won't replace the large areas of established grasses; however, where there is a problem of broken land, alkali or wet, heavy soil, this grass should be given a trial.

LEGUME HAY CROPS

Legumes are characterized by their flower and seed pods. In this group are included Clover, Alfalfa, Peas, Beans, Vetches and a number of others. Most of them have a tap root which is capable of growing into the soil to considerable depth. This capacity for soil penetration tends to open the soil and thus helps in draining it. These plants have another very important characteristic; they contain a high portion of very essential livestock food nutrient i.e., the protein which is so necessary to the production of bone and muscle in young growing animals.

A heavy stand of Alfalfa.

Legumes use large amounts of nitrogen when producing stems, leaves and seed. However, there are certain bacteria which are capable of developing on the roots of legumes. If these organisms are present in the soil they become attached to the roots of the growing plans where they multiply, forming nodules. These bacteria have the capacity of taking free nitrogen from the air. This nitrogen can be used by the plant, thus promoting growth. After clover has been plowed down and seeded to cereal crop the nitrogen thus made available is used by the grain crop. These bacteria are introduced by the use of soil from old alfalfa or sweet clover fields at the rate of two hundred pounds per acre, drilled with the seed. A much less laborious method is to apply artificial inoculum which may be purchased from most seed houses. This material is moistened (usually with milk) and the seed is treated. Care must be taken to

avoid exposing the material to direct sunlight, which renders it useless.

ALFALFA

Alfalfa is often called the King of Hay Crops because of its high feeding value and palatability. The soils of western Canada are ideal for the production of this crop due to their high lime content. True, our climate is somewhat extreme and care must be taken to select only varieties capable of coming through winters of light snowfall and low temperatures.

A single plant of Alfalfa.

Alfalfa does not do well on an alkali soil or on areas where water might lie during early spring. By avoiding the low areas of the farm, Alfalfa will produce crops of excellent hay on our heavy clays and even on lighter sandy soils. Under conditions in Manitoba, two and sometimes three cuttings can be made.

Varieties: **Grimm**

Selected from Alfalfa grown by Wendelin Grimm, a farmer in Minnesota, who purchased the seed in Germany. The crop produced from this seed winter killed with the exception of a few plants which survived. The seeds of these plants were sown and proved to be hardy. This is the standard variety now grown in Manitoba. It is susceptible to bacterial wilt. This disease is not prevalent as

yet in Manitoba but is very general in the United States.

Ladak

Introduced from India by the United States Department of Agriculture. The University of Saskatchewan introduced it into Canada in 1925. This variety is sometimes called a single cut Alfalfa because it usually outyields Grimm in the first cutting. The second growth is slow to recover after cutting and is usually considerably less in yield. Ladak is resistant to bacterial wilt. In the United States where this disease is becoming serious there is an increased interest in this variety.

Macsel

Developed at the Manitoba College of Agriculture, some years ago by Professor Wm. Southworth. Very hardy; somewhat superior to Grimm in seed setting.

Viking

Introduced by the Dominion Forage Crops Laboratory, Saskatoon. Very hardy; highly drought resistant; quite resistant to bacterial wilt; recovers very quickly after cutting; good seed setting capacity.

Ferex

Introduced by the University of Alberta. Apparently quite hardy; improved seed setting capacity; yields about the same as Grimm.

Rhizoma

A new variety of alfalfa produced at the University of British Columbia. This alfalfa has a different root system from other alfalfas, hence the name Rhizoma. The root system not only has a typical tap root but has Rhizomas or surface roots which tend to thicken the stand.

SWEET CLOVER

A biennial crop such as Sweet Clover makes a strong appeal to the western grain grower, because it can be seeded with a grain crop in the spring and the next year a crop of feed taken off. When the hay crop is removed the field can be plowed and worked as a summerfallow. If there is ample moisture a crop of wheat may be

produced the following year, yielding in many cases as high as from a bare fallow. Sweet Clover lends itself to a rotation scheme such as this, which works in with straight grain growing, or even where considerable stock are kept.

Sweet Clover is a splendid soil improver where moisture is abundant. Its vigorous growth provides a large quantity of green material which can be plowed down for green manure. Like all legumes it has the capacity to increase the nitrogen in the soil. From the aspect of tonnage of feed produced it ranks very high. The flavor of the feed is quite bitter and stock must become accustomed to it before they eat it readily. This bitter taste is due to a substance called "coumarin". When stock are fed largely on Sweet Clover hay during the winter months, the blood will not coagulate. This sometimes causes serious bleeding, especially if cattle are being dehorned.

The presence of green volunteer Sweet Clover in a wheat crop sometimes causes the grain to become tainted, resulting in a lowering of the grade. This is known as "Melilot Taint" of grain.

Excellent feed can be produced by seeding Sweet Clover fairly thickly, resulting in finer stems and more leaf, with high protein content. It should, however, be fed mixed with some hay or green oat sheaves. When feeding Sweet Clover as roughage, concentrates should be added to properly balance the feed ration.

Care should be taken to use only high germinating seed and it should not be seeded below one inch in depth. Seed planted too deeply will not germinate until brought to the surface. Sweet Clover seed is enclosed in a hull which if not removed, will cause the seed to lie dormant in the soil for a considerable period, resulting in volunteering to such an extent as to make it difficult in some cases to decide whether the field has been seeded to grain or Sweet Clover. A good plan to follow is to select only good seed and to plant shallow. If care is taken, Sweet Clover will cause very little trouble.

Sweet Clover is divided into two groups:

1. **White Blossom**
   subdivided into:
   (a) Tall growing varieties:
   Common, Arctic
   (b) Low growing varieties:
   Alpha, Brandon-Dwarf

2. **Yellow Blossom**
   Varieties:
   Common, Aura, Erector, Zouve

White Blossom—Common

Grows very tall with coarse, woody stems. Should be cut quite early, when about three feet tall, for best hay.

White Blossom—Arctic

Developed by the University of Saskatchewan; is hardy; somewhat finer stem and with more leaf than Common. Does not grow as tall as Common.

White Blossom—Alpha

Developed by the University of Saskatchewan; has a fine stem similar to Alfalfa, and is leafy. It sends out numerous fine stems from the crown similar to Alfalfa. Does not give yields of hay equal to taller growing Sweet Clover types.

White Blossom—Brandon-Dwarf

Developed at Brandon Experimental Farm. Low growing type, branching from the crown; fine stem and very leafy; produces an excellent quality hay but much lower in yielding capacity than the tall growing type.

Yellow Blossom—Common

A tall growing type but somewhat finer stem than tall white, producing abundant leaves. As the seed ripens the branches tend to trail on the ground. These branches are usually missed by the mower and as a consequence the seed falls to the ground, causing trouble in the following crop of grain.

Yellow Blossom—Aura

Developed at the University of Manitoba. An erect growing type, thus avoiding seed loss and volunteering. The stems are comparatively fine with abundant leaf surface.

Yellow Blossom—Erector

Developed at Dominion Experimental Farm, Brandon. An upright type, bushy in appearance, abundant leaf, and blossoms somewhat earlier than Aura.

Yellow Blossom—Zouve

Similar to Common but more erect type; somewhat coarser and later in maturity than Common Yellow.

ANNUAL SWEET CLOVER

Under our climatic conditions, the season is actually too short for Annual Sweet Clover. The tendency is for this crop to produce very short stems, which causes low yields of hay. However, beekeepers find that this crop extends the period of pasture into the fall months.

Varieties: **Hubam**
Melana

RED CLOVER

Red Clover is semi-hardy, but requires ample moisture. This Clover is restricted to those areas in western Canada where there is usually ample snow to protect it during the winter. On the open plains where there is danger of the snow blowing off the fields, Red Clover has always been very uncertain. It is biennial in habit but some few plants will survive after the second year. On heavy clay soils, Red Clover mixed with Timothy produces excellent hay.

Varieties: **Manhardy**
Produced by the Manitoba Agricultural College, by selection for hardiness.

Altaswede
Produced by the University of Alberta, by selection from a late Swedish Red Clover. It is a short lived perennial in habit and fairly hardy, extending to three years in some districts.

ALSIKE CLOVER

Alsike Clover is suited to those areas where Red Clover will grow and to areas where drainage is too poor to permit Red Clover to succeed. It is a comparatively low growing plant, acting as a short lived perennial. This Clover is now found growing along roadsides throughout northern Manitoba and parts of Saskatchewan. Makes excellent pasture mixed with Brome, Timothy or Meadow Fescue.

WHITE DUTCH CLOVER

White Dutch Clover is a short growing perennial with very fine stems and small leaves. Is used on lawns and as a pasture mixture with a grass crop.

MILLETS

Millets are warm weather annuals, hence have a place on western farms where livestock are kept on pasture during the summer. One of the unfortunate disadvantages of summer pasture is that most grasses tend to become dry and wilted during the heat of mid July and August. In order to have luscious green fodder at this time, Millet seeded in late June furnishes abundant feed which can be cut daily and fed to stock or pastured. This crop is also capable of producing feed during periods of drought because it grows very rapidly and must have warm weather.

Varieties: **Hungarian**

Siberian

These are of the Common Foxtail type, producing satisfactory hay.

Crown

Is of the proso or grain type, a type which produces fair quality hay; is a trifle coarser than Siberian, with the stems covered with fine hairs. The seed produced can be used to feed stock when mixed with cereals and finely ground.

Empire

Belongs to the Foxtail type. It is considerably later than other varieties.

MILLETS FOR FODDER

In areas where perennial grasses do not produce high yields due to lack of moisture, Millets can be seeded late in the spring, and to avoid all danger of frosts, early June is the best time. Foxtail types are most satisfactory for hay purposes. The stems are fine and there is abundant leaf produced. The Hungarian, Siberian and Empire varieties make very satisfactory hay crops. As a general rule, Millets will produce higher yields per acre than Oats or Barley cut green.

CORN PRODUCTION IN MANITOBA

Corn is an important crop in areas where the growing season is comparatively free from frosts. It can be used as a forage crop where the corn is harvested before ripening and used as sheaf feed, or it can be placed in a silo for winter feeding of stock. A few acres may be planted and used as pasture when the rush of harvest begins. In southern areas the crop may be matured and a valuable feed grain produced.

A Manitoba corn field.

This crop can be used as a very important addition to our cropping system on the western plains where there is a hesitation to seed down a large area to a grass crop. It can be used to replace summerfallow to some extent, being an inter-tilled crop, thus making it a valuable method for the control of weeds. As a general rule a crop of grain following corn is much more free of weeds than following a summerfallow.

Corn can be used as an aid in the prevention of soil erosion.

Land which produced a grain crop may be cultivated or one-wayed early in the fall. The stubble will help to hold the snow during winter. In the spring this land will not drift, owing to the trash cover. This land may then be carefully worked and the corn planted up to May 24th. At this time the soil has warmed up and since rains may be expected during June the corn grows very rapidly. Frequent cultivation of the crop destroys weeds. When the crop is harvested the corn stalks hold the snow and thus prevent soil erosion. The next spring the land may be cultivated and seeded to a grain crop. This allows greater crop acreage on the farm than is the case where a large area of land is under bare fallow.

Varieties: **Falconer**

Is a very popular variety for grain production. It is a splendid yielding variety and is medium early. Falconer is a semi-dent with lemon yellow kernels and white cob. The plant is fairly tall growing but the ears are low on the stalk. This is objectionable when the corn picker is used. Rows 8 to 14 per ear.

Minnesota 13

A true dent type. Is a lower yielding and later variety than Falconer. Kernels are golden yellow, cob red or pink. The plants are taller than Falconer with the ears carried much higher. Rows 14 to 16 per ear.

North Western Dent

Earlier in maturity than Falconer. Does not yield as high. Has red kernels which makes it objectionable from a commercial standpoint. Good fodder corn.

Gehu

An early, short growing variety; excellent for pasture or hogging off in the fall.

Manitoba Flint

Also an early variety. Can be used in the northern areas for fodder where earliness is essential.

HYBRID CORN

Hybrid corns are extremely vigorous and produce excellent yields of grain. Their adaptation is to areas in the southern districts of Manitoba where the growing season is longer and average temperatures considerably higher. Corn breeding work is now

being done at the University of Manitoba and the Dominion Experimental Station at Morden, Manitoba. Certain hybrids have proved to be satisfactory for the west, namely, Hybrid 240, Kings Cross E and several others.

The advantage of hybrids lies in their yielding capacity, the height the cob is carried on the stalk and also the strength of the stalk. They are especially satisfactory where corn picking machinery is used.

New hybrids are being introduced year by year. The corn grower should keep in touch with the University of Manitoba, Dominion Experimental farms at Morden and Brandon or the Extension Service, Department of Agriculture, Legislative Building, Winnipeg, in order to know what new hybrids are giving best results in his district.

SUNFLOWERS

Sunflowers are now one of the important crops in portions of Western Canada. Due to the increased demand for high quality vegetable oils, Sunflowers offer splendid possibilities as an extra cash crop. Large quantities of vegetable oils are imported into Western Canada every year. These oils consist of Soy Bean, Peanut and Cotton seed oils.

Sunflower oil is of high quality, and the plant is well adapted to large areas of Western Canada. Such a crop can be utilized to lower the amount of imports into our country. We must ever bear in mind, however, that the price received for this or any other crop depends largely on the price of a similar crop delivered from an outside source.

Co-op Vegetable Oils Limited, at Altona, Manitoba is prepared to process large quantities of Sunflower seed. It is also in a position to supply the prospective grower with complete information on Sunflower culture. The future looks bright for oil crops of this nature because there is a constantly increased demand for manufacturing purposes. The price will fluctuate from year to year.

A field of Sunflowers, well cultivated is a splendid method of weed control and in many instances the crop can be used as a summer-fallow substitute.

SEED PRODUCTION

The production of registered crops of grass and clover requires more painstaking care than that required for cereal crops. Cereal crops are self-pollinated (except Rye); therefore there is much less danger of crossing in Wheat, Oats or Barley. Grass and Clover are cross-pollinated; therefore segregation is of prime importance.

Alfalfa growers must exercise extreme care in separating their fields by at least one quarter mile from any other field of Alfalfa. If the variety is not the same as that already growing on the farm

Crested Wheat Grass for seed production.

there is very little chance of it meeting the requirements of the Canadian Seed Growers' Association. The first thing to do then, is to clean up old alfalfa fields and any plants which may be growing along the fence line or border of the field. In planting it is not a good policy to seed on a field next to another farm because there is no guarantee that the neighbor will not seed Alfalfa on the adjoining field. This also applies to clovers and grasses. It will be readily seen then that segregation is of first importance.

Second in importance is freedom from weeds. In the case of cereal crops most weeds can be separated from the grain with

efficient cleaning machinery. Grass and clover seed is small and in the case of grass, extremely light in weight. Cleaning is difficult at any time and if the weed seed is the same size and weight as the grass or clover seed it makes the separation job almost impossible. For example, it is useless to seed Brome, Slender Wheat, Crested Wheat or Meadow Fescue in a field that has quack grass in it. If mustard is present on the field intended for clover, the cleaning job will be costly and very difficult.

If registration is to be maintained, all grass and clover fields for seed production must be inspected every year, whether a seed crop is harvested or not. THIS IS IMPORTANT.

Brome for seed production,
grown in rows to facilitate weed control.

Rules to follow are:

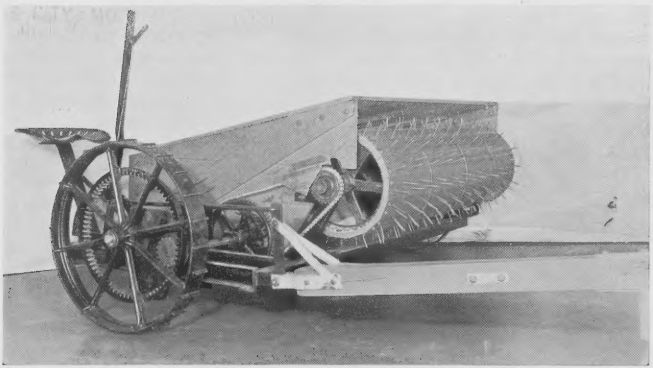
1. Seed on clean land free of those weeds which will be difficult to remove from the seed produced.
2. Study the crop, its habit of growth, its type and characteristics of the variety.
3. Segregate the field from other fields of grass and clover by one-quarter mile. (In case of corn, by one-half mile).
4. Use Registered seed only.

5. Apply early in the season for crop inspection one year after the crop is planted. Application for inspection should be made to the Plant Products Division, Production Service, 730 Dominion Public Building, Winnipeg. This must be done each year.
6. Harvest when the crop is ripe and thresh only when thoroughly dry.
7. Clean the seed properly and apply for seed inspection. Where proper cleaning machinery is not available ship the seed to a seed cleaning plant where the product can be prepared for seed.
8. Remember, successful seed production depends on timely care of the crop. Future sales of seed from the farm depends on the high quality being maintained.

GENERAL INFORMATION

THE RIGHT TIME TO HARVEST HAY AND CLOVER CROP FOR SEED

GRASSES	Brome	When heads turn brown
	Crested Wheat	When heads turn greenish brown
	Meadow Fescue	When heads turn light brown
	Timothy	When heads turn straw color
	Slender Wheat	When heads turn straw color
	Reed Canary	When seed light brown
	Red Top	When heads turn brown
LEGUMES	Alfalfa	When pods are brown
	Sweet Clover	When pods are brown
	Red Clover	When pods are brown
	Alsike	When pods are brown



Seed stripping machine.

THRESHING FOR SEED PRODUCTION

The combine can be used in threshing grass and clover seed but care must be taken to allow the crop to have the stem ripe and dry as is the case when harvesting cereal crops. Moisture must be reduced to a minimum or the seed will heat in the bag or bin. Combining causes a certain loss of seed by shelling, but some contend that this loss is made up in the saving of labor by this method over the old method where the material is cut, dried in the stook and then hauled to the threshing machine. The combine cylinder

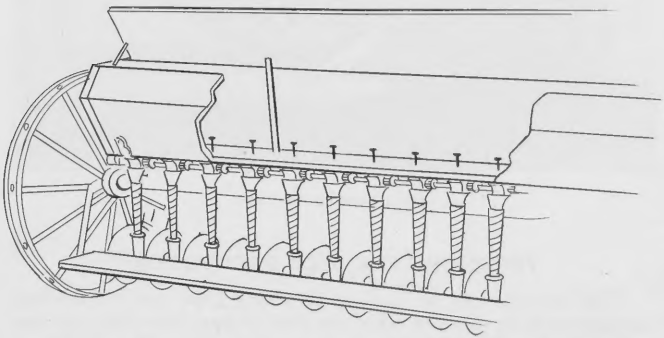
speed must be reduced while the decks remain at normal speed. Sufficient wind must be allowed to clean out straw and chaff; this requires careful adjustment. The screen surface must be kept clean or the seed will go over on the ground.

Stripping machines are now being introduced. These machines consist of a wooden cylinder with spikes driven in; the concave is also of wood with spikes. These machines work rapidly and require very little power to operate. Several companies are now manufacturing these machines and some few farmers have made stripping machines out of waste material right on the farm.

A HANDY DEVICE FOR SEEDING GRASS WITH THE GRAIN DRILL

Many farmers wish to sow grass and clover but have no grass seed attachment for their drills. Further, some grass seeders now in use are not adapted to grass seed such as Brome.

The grain drill can be adapted to the seeding of grass, clover or corn quite readily. Care must be taken to set the drill to sow the proper amount. Weigh sufficient seed for one quarter acre and set the drill as close as it will operate. When the quarter acre has been seeded set "Open or Closed" to where the proper amount of seed will be applied. The chief difficulty is to get an even distribution of seed through the drill, especially where a mixture is being seeded. The following drawing shows a very efficient device for keeping the seed properly mixed in the drill box.



Use a piece of wood 1 inch by 1½ inches. Cut about 4 inches shorter than the inside of the grain box. Place in bottom of box over runs and drive four-inch nails downward into the run. (Looped wire may be used instead of nails). At each end attach a handle. Fill the box about one quarter full of seed and have a man stand on the drill moving the device back and forward. This prevents the seed from clogging in the runs. Keeping the seed thoroughly mixed will result in even seeding.

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